MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

PEM0016 – ALGEBRA

JUNE INTAKE

23 OCTOBER 2017
9.00 a.m to 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **3** pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of marks for each question is given.
3. Please write all your answers in the answer booklet provided.

Answer ALL the questions (100 marks).

Question 1 (25 Marks)

(a) Solve the inequality and express your answer using interval notation.

$$\frac{(-x+5)^2(x-4)(x+1)}{x^2+x-6} \leq 0$$

(8 marks)

(b) Find in the simplest form, the first 3 terms of the expansion of $(1-2x)^5$, in ascending power of x. Then determine the coefficient of x^3 in the expansion of $(1+x)(1-2x)^5$.

(9 marks)

(c) Solve $\sqrt{3x-5}-\sqrt{x+7}=2$. (8 marks)

Question 2 (25 Marks)

(a) Given function $f(x)=\frac{1}{2x-1}$ and $g(x)=\sqrt{x+1}$.

(i) Determine $f \circ g(x)$. (2 marks)

(ii) Determine the domain of $(f \circ g)(x)$ and express the domain using **solution set**. (4 marks)

(b) Determine the inverse function of $h(x)=3^{2x+1}$. (4 marks)

(c) Solve the following equations.

$$8^{x-1} \times 2^{2y+1} = 4^7$$
$$9^{y-4} \times 3^x = 3^4$$

(6 marks)

(d) Sketch the function $k(x)=-2(x+1)^2+2$ using transformations.
Show each transformation in separate graph.
Label three coordinates in each graph. (9 marks)

Continued...

Question 3 (25 Marks)

(a) Find the partial fraction decomposition of $\dfrac{3x^3+3x^2+5x+6}{x^2\left(2x^2+x+3\right)}$. (12 marks)

(b) It is given that $f(x)=2x^3-x^2-13x-6$.

(i) Show that $f(x)=x+2$ is a factor of $f(x)$. (1 mark)

(ii) Determine the zeros of $f(x)$. (5 marks)

(iii) What is the maximum number of turning point and y-intercept? (2 marks)

(iv) Sketch $f(x)$. (5 marks)

Question 4 (25 Marks)

(a) Solve the following equations by using **inverse matrix method.**

$$\begin{cases} -x+3y+4z=-4 \\ 2x+5z=31 \\ x-y+2z=20 \end{cases}$$

(17 marks)

(b) Given that $B=\begin{bmatrix} k & -1 \\ 3 & 5 \end{bmatrix}$ and the determinant of B is 13.

(i) Determine k. (2 marks)

(ii) Matrix C and matrix A are 2X2 matrix. Determine matrix A if

$$2B+CC^{-1}-A=\begin{bmatrix} 0 & -4 \\ 7 & 13 \end{bmatrix}$$

(4 marks)

(c) Given $P=\begin{bmatrix} 1 & -20 & 5 \\ 2 & 3 & 5 \end{bmatrix}$ and $Q=\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

Determine PQ. Justify your answer if there is no solution.

(2 marks)

End of Paper